

SESSION I

TIME: Tuesday 13 April, 8:30-10:00

ROOM: Pride of Baltimore (6th Floor)

TRACK: Flood and Coastal Storm Damage Reduction

TOPIC: Formulation Approaches

MODERATOR: Scott Clark, Sacramento District

PRESENTATIONS:

Title: Hamilton City Combined Plan Formulation

Presenter: Scott P. Miner, Sacramento District

Abstract: Hamilton City is an agricultural town of 1,900 residents on the Sacramento River about 85 miles north of Sacramento, California. The community currently relies on the privately-owned "J" levee for flood protection, although the levee does not meet any design standard. Evacuation of the community and extensive flood fighting to prevent failure of the levee have been necessary six times in the past 20 years. Corps studies completed in 1991 and 1996 concluded that a single-purpose flood protection project would be economically unjustified and marginally justified, respectively.

The Corps' six step planning process and the procedures specified in EC 1105-2-404, "Planning Civil Work Projects Under the Environmental Operating Principles," were used to identify a primary purpose (ecosystem restoration) and to perform trade-off analysis, ranking of plans, and plan justification for combined alternatives. The application of the procedures in EC 1105-2-404 to the Hamilton City Study and adjustments made to the procedures will be discussed.

Title: FDR Issues in the Arid Southwest

Presenter: Kathy Bergmann, Los Angeles District

Abstract: Flood damage reduction issues in the arid Southwest present unique problems and opportunities quite different from those in more humid areas. Most streambeds are ephemeral or have very low flows. They can go from these normal conditions to a raging torrent in a matter of hours. Many of the streams migrate laterally or are on large alluvial fans. Limited periods of record make analysis difficult.

Population growth in the region is almost exponential. The Phoenix and Las Vegas areas are examples of this growth. The Corps and local sponsors have successfully met these unique challenges in a number of ways. Projects and studies such as the Indian Bend Wash, Scottsdale, AZ, Flamingo-Tropicana, Las Vegas, NV, Whitewater, Thousand Palms, CA, Rillito River, Tucson, AZ, and the Arizona Canal Diversion Channel, Phoenix, AZ, used different methods to solve flooding problems.

Title: Demonstration Program in Arid Southwest

Presenter: Meg M. Jonas, ERDC

Abstract: The Urban Flooding and Channel Restoration Demonstration Program for Arid and Semi-Arid Regions (UFDP) was initiated in March 2003. The goal of the UFDP is to develop and demonstrate innovative technologies for urban flood damage reduction and stream restoration in arid and semi-arid

watersheds, with highest initial interest being in the State of Nevada. The program is a collaborative effort between the Corps of Engineers Engineer Research and Development Center (ERDC) and the Desert Research Institute (DRI) of Nevada. Work units funded in FY03 were focused on the Las Vegas Wash (Las Vegas, NV) and the Lower Truckee River (Reno, NV), with the majority of the funding going toward the Las Vegas Wash. Demonstration topics were developed with input from local interests and Corps field representatives, and are being conducted in coordination with local stakeholders such as SNWA and Clark County Flood Control District.

**Title: Dam Operations for Flood Damage Reduction and Fish in the Upper
Columbia Basin**

Presenter: Evan Lewis, Seattle District

Abstract: Libby and Hungry Horse dams are flood control projects on the Kootenai River and South Fork Flathead Rivers, respectively, in northwestern Montana. As part of compliance with the Endangered Species Act, the owners of these projects, the Corps of Engineers (Libby) and the Bureau of Reclamation (Hungry Horse) are preparing an environmental impact statement to evaluate an alternative flood control operation, known as variable discharge or VARQ (with 'Q' representing engineering shorthand for discharge), to provide flood protection based on project authorizations while improving the chance of reservoir refill and facilitating operations in the spring and summer for the benefit of sturgeon, bull trout, and salmon, all species listed as threatened or endangered. Key issues surrounding alternative flood control and fish operations at Libby and Hungry Horse include:

- (1) Local and system flood control;
- (2) Fisheries and other aquatic ecosystem impacts and benefits in affected reservoirs and rivers;
- (3) Groundwater seepage in agricultural areas;
- (4) Levee integrity concerns;
- (5) Potential exposure and transport of contaminated sediments;
- (6) Potential exposure and vandalism of cultural and prehistoric sites;
- (7) Recreational impacts on affected reservoirs and rivers;
- (8) Columbia system power generation impacts; and
- (9) Trans-boundary impacts in Canada.

SESSION III

TIME: Tuesday 13 April, 3:30-5:00

ROOM: Pride of Baltimore (6th Floor)

TRACK: Flood and Coastal Storm Damage Reduction

TOPIC: Realize the Opportunities with Non-Structural Flood Damage Reduction

MODERATOR: Falcon Hull, NFPC, New Orleans District

PRESENTATIONS:

Title: **Evolution of a Non-structural Flood Damage Reduction Project at Newport, Minnesota**

Presenter: **Kevin W. Bluhm, St. Paul District**

Abstract: An initial Section 205 analysis utilizing structural methods for the City of Newport, MN showed a benefit-cost ratio for a potential project was on the order of 0.2. The city of Newport indicated an interest in examining the economics of a floodplain park behind levee reach 2 in December 2003. This represents a nonstructural alternative, which is currently being examined to determine whether a federal interest exists. This nonstructural alternative involves moving some homes out of the floodplain, and elevating others above the 1 percent return flood. This alternative may represent a more cost effective solution.

A nonstructural alternative is currently being studied as alternative 3 of this Initial Appraisal Report. We are currently assessing the economics of removing the five most flood prone homes, and using this area as a 5 acre flood plain park. These 5 homes have present damages ranging from 10 to 60 percent and have an average depreciated value of 73K. Additional benefits to this concept include reduced flood fighting costs, and reduced city infrastructure costs to sanitary sewer systems.

Title: **Non-structural Analysis on Rocky Creek in Augusta, Georgia**

Presenter: **Wesley A. Bushnell, Savannah District**

Abstract: The presentation will focus on the process rather than the specifics of how the non-structural aspects of Rocky Creek evolved. Information will be presented on the initial identification of those structures that would potentially benefit from a non-structural solution. PDT and sponsor involvement in assessing the viability of a non-structural solution versus a structural solution for identified areas will be related. A review of Corps policy regarding assumptions and requirements of proposed solutions will be included. Emphasis will be placed on application of Section 219, PL 91-646 and certain aspects of federal versus local guidance. The presentation will touch on the impact of structural solutions and their impact on viability of non-structural scenarios. The impact of alternative land use, passive recreation parks, of those evacuated structures will be included. Closing of the presentation will consist of potential problems indigenous to Rocky Creek study. Examples would be the imposition of FEMA buyouts on final plan selection, valuation of mobile homes and the potential for a total non-structural solution. As a summation the presentation will end with an enumeration of alternative plans; quantification of NED benefits and final plan selection.

Title: **New Uses of Evacuated Floodplains – Experience the Power**
Presenters: **Larry S. Buss, NFPC and Stuart A. Davis, IWR**

Abstract: This presentation will feature a comprehensive examination of new flood plain land use options that comply with the National Flood Insurance Program and Corps authorities. Options available to communities to provide their cost share of the relocation/buyout project with funding from State and other sources will be discussed. Supplemental funding has enabled communities to gain complete ownership of evacuated flood plains so ecosystem restoration and /or recreation projects can be realized. The presentation will discuss monetary and non-monetary valuation measures of alternative new flood plain uses. An update will be provided of 3 projects that were discussed at the Economics and Environmental Conference in New Orleans, Louisiana held in 2002 that incorporated new uses of the evacuated flood plain. An additional project that recently used ecosystem restoration as a new use of the evacuated flood plain will be briefly discussed.

Title: **Non-structural Measures with HEC-FDA**
Presenter: **Robert Carl, IWR-HEC**

Abstract: The complexity of today's multi-objective planning process requires application of advanced analysis methods in the systematic formulation and evaluation of flood damage reduction projects. New and efficient methods are necessary to develop more comprehensive analyses that broaden the damage focus to include the application of non-structural flood damage reduction analyses. This analysis must be conducted with increasingly limited resources. Better means of illustrating the results (GIS depiction), and greater user access to selecting and analyzing nonstructural measures are needed and it must be performed within the risk analysis framework required by the U.S. Army Corps of Engineers.

In coordination with the National Nonstructural and Flood Proofing Committee, the Corps' Hydrologic Engineering Center is developing new nonstructural analysis tools that will better enable the Corps to efficiently perform its flood damage reduction analysis responsibilities. The goal is to provide Corps field offices with a tool that highly integrates existing capabilities with analysis and display enhancements to improve non-structural assessments and project formulation and evaluation capabilities. The capability would be incorporated within the next major release of the HEC-FDA (Hydrologic Engineering Center's Flood Damage Reduction Analysis) program. This presentation will document the status of the design and development to date.

SESSION V

TIME: Wednesday 14 April, 3:30-5:00

ROOM: Pride of Baltimore (6th Floor)

TRACK: Flood and Coastal Storm Damage Reduction

TOPIC: Innovative Analytical Procedures and Tools

MODERATOR: Lillian Almodovar, HQUSACE

PRESENTATIONS:

Title: Risk Analysis Model for Hurricane and Storm Damage Reduction

Presenter: David A. Moser, IWR

Abstract: The benefits and costs of hurricane protection and storm damage reduction projects are highly uncertain. Predicted damages and benefits are dependent upon a variety of engineering and economic models and assumptions. Future damages are dependent on the sequence of storms, their characteristics, property losses, erosion losses, and institutional and other factors. In addition to influencing benefits, many of these variables and factors influence lifecycle project cost, particularly for beach nourishment projects. The Corps is developing an evaluation model that can be reliably and efficiently used to evaluate the common hurricane protection and storm damage reduction measures.

This model combines the engineering and economic sources of risk and associated uncertainty for shore protection projects within a life-cycle framework. The life-cycle model generates sequences of plausible storms and shoreline erosion, post-storm shoreline recovery, and background erosion in both the without and with project conditions. These are linked to the property inventory to estimate life-cycle property losses. Comparing "with" and "without" condition provides an estimate of the engineering and economic performance and life-cycle cost of hurricane protection and storm damage reduction projects.

This paper introduces the basic modeling approach, the modeling architecture, the data, and reviews the model to date. It also provides a status report.

Title: New Insights into Erosion-Damage Curves from Hurricane Isabel

Presenter: Rosemary Cohen, Wilmington District

Abstract: For years, the USACE has struggled with modeling hurricane and storm damage reduction for its coastal studies. These reductions in damages lead to the most important category of benefits in the justification of major beach nourishment projects. One of more important components of these benefits is the erosion-damage curve used in the damage reduction model. With little historical data to base these curves upon, they have been traditionally developed through expert opinion and with little coordination between Corps district's analysts. Recognizing this, USACE Headquarters has recently earmarked some funds that will allow us to generate and analyze actual data from Hurricane Isabel (September 2003). This data should prove extremely valuable to the Corps for calibration purposes of our Becky-type coastal models. Specifically, it would give us actual data points on our erosion-damage curves. Dove-tailed into our efforts are data funded by FEMA Region IV containing hundreds of building-by-building damage assessments by a team of engineers. This data includes damage assessment on hundreds of oceanfront properties and captures hundreds of data points on the impacts of surge and wave action on various types of structures. One of our co-authors, Spencer Rogers, a nationally renowned expert in the area of coastal construction, is one of the engineers who worked on this assignment with FEMA. Mr. Rogers also serves on the Becky development team with IWR (as does Bob Finch) and has consulted with Wilmington District on our erosion-damage relationships in the past. Ms. Rosemary Cohen has worked with the

Wilmington District doing coastal economics for several years. The goal of this study effort will be to develop a set of erosion-damage curves for various structure types based on actual storm data that will pass the scrutiny of higher levels of review.

Title: **The National Ocean Economics Project**
Presenter: **Jeff Adkins, NOAA**

Abstract: The National Ocean Economics Project (NOEP) is an independent research project conducted at universities on the east and west coasts, and funded by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA). The NOEP has two primary goals: (1) to compile a comprehensive collection of data on the economic value of the ocean and coastal resources of the United States; and (2) to define and describe the ocean and coastal economies. This presentation will describe the NOEP and the products it has generated to date. Also discussed will be ten important conclusions drawn from the data, and their implications for coastal resource management, transportation, land use planning, economic development, and economic data and information.

Title: **HEC-FDA Flood Damage Reduction Updates**
Presenter: **Jason T. Needham, IWR-HEC**

Abstract: The Hydrologic Engineering Center (HEC) is developing computer software for performing comprehensive flood damage analyses. The package, Flood Damage Analysis Version 2.0, merges the Flood Damage Analysis Version 1.2 (FDA), Flood Impact Analysis (FIA) Version 1.0 with GIS functionality for developing structure inventories and analysis. FDA 2.0 also adds capabilities to interactively analyze and display spatially referenced data. Recent and planned upgrades to the software will be discussed.

SESSION VI

TIME: Thursday 15 April, 1:30-3:00

ROOM: Pride of Baltimore (6th Floor)

TRACK: Flood and Coastal Storm Damage Reduction

TOPIC: Innovative Analytical Procedures and Tools

MODERATOR: Mitch Laird, Louisville District

PRESENTATIONS:

Title: “How Things Don’t Happen” In The Plan Formulation

Presenters: Wayne Crull, Galveston District and Steve Fitzgerald, Harris County Flood Control District

Abstract: Section 211(f) of WRDA 1996 has allowed the Harris County Flood Control District (HCFCD) the opportunity to take the lead on planning, design, and construction of three federal flood damage reduction projects with the federal government then reimbursing the local sponsor as work is complete. Working as the lead on a federal project has provided insight into “How things don’t happen” during plan formulation. The HCFCD has been a local sponsor on Corps-led projects since its formulation in 1937. In addition to the three local sponsor led projects on Brays Bayou, Hunting Bayou, and White Oak Bayou, the HCFCD is currently the local sponsor on Sims Bayou, Greens Bayou, Clear Creek, and Harris Gully flood damage reduction projects. Prior to these projects in and around Houston, Texas, the HCFCD has partnered with the Corps on seven successful flood damage reduction projects. This presentation provides observations and comments on plan formulation for the three local sponsor led projects – Brays Bayou, Hunting Bayou and White Oak Bayou. Brays Bayou and Hunting Bayou flood damage reduction projects are general reevaluation studies and the White Oak Bayou started with a reconnaissance study and is currently a feasibility study. All of these project studies have worked through challenges during plan formulation. This presentation shares the experiences of the HCFCD gained over the life of these projects.

Title: Using ArcGIS to Link SWMM and HEC-FDA

Presenters: Mitch Laird, Louisville District and Thomas G. Tri, Skees Engineering

Abstract: The U.S. Army Corps of Engineers (COE) applies the HEC-FDA software to calculate expected annual flood damages associated with existing conditions and proposed alternatives of flood control projects. Urban flood damage studies require valuation and elevation data for the structures to statistically determine the expected annual damages. In a highly urban watershed, the gathering and analysis of this data has always been tedious, time-consuming, and costly. The Southwest Louisville Flooding Study provided a special challenge because of the large number of structures in the study area (68,000), the size of the study area (32.0 sq. mi.), and the large amount of data being generated from the urban hydraulics software (SWMM), which modeled a combined sewer area with 4,800 sewer manholes. GIS proved to be a valuable asset to facilitate the study. GIS data from the Louisville and Jefferson County Information Consortium (LOJIC) was used to develop input for the FDA model, including assessed property value, year of assessment, first floor elevation (derived from TIN points), style of structure, property use classification, parcel identifier, and address.

One particularly challenging aspect of the study was to develop a method for determining anticipated flooding depths at each structure, based on the output of the SWMM model. Because the model only provided volumes of surcharge at each node, a method was developed to translate the discharge volumes to a flood elevation for each of the 68,000 structures. Because of the extreme flat nature of the watershed, the discharge volumes spread across multiple sub-basins. A custom ArcGIS/Spatial

Analyst/VBA application was developed to iteratively distribute the volumes of water over the localized sub-basins until equilibrium existed across the study area.

Title: Technological Applications for Inventory of Floodplain Areas

Presenters: Kevin W. Bluhm, St. Paul District and Jason Weiss, URS

Abstract: Using current technology for a flood study, state-of-the-art data collection techniques were implemented to obtain standard economic structure data, as well as additional data useful for GIS applications. From a rare summer flood, an entire city was flooded and we needed to inventory the entire town to build the database. A primary contractor for the data collection portion of the study was utilized to bring new techniques to the field. For data collection, several teams with mini computers and digital cameras went into the field and collected structure data for some 1,200 structures. While in the field, X,Y, & Z data points were also collected. The mini computers data was downloaded daily into a main database, error checked, and plugged into a ArcGIS format so the data is grid out on GIS mapping to show all the details. It has been very valuable for the economics work, but also for the sponsor, as they did not have a digital map of the city. The GIS format has allowed us to perform several mini scenarios as we formulate plans and see changes to the map graphically. This technology has helped save resources and allowed the team to focus on fine-tuning plans.

Title: Development of Project Specific Depth-Damage Relationships

Presenters: Keven Lovetro, New Orleans District and Brian Maestri, New Orleans District

Abstract: Recurrent flooding in Southern Louisiana has led Congress to authorize the New Orleans District to conduct numerous flood damage reduction studies. Accurate estimates of damages to residential and non-residential structures and their contents are essential in establishing the feasibility and optimality of engineering plans that are designed to alleviate the effects of flooding. The relationship between the depth of flooding and the severity of damage to structures and their contents is an integral component of the methodology used to estimate the economic benefits associated with floodplain modifications. The presenter will discuss the "Expert Opinion" method that was used to develop depth-damage relationships, which was based on interviews with local building experts (including home builders and remodeling and repair experts). The experts estimated the physical and monetary damages to prototypical structures at various depths of flooding and translating these estimates into specific percent-damage-to-structure-value relationships. Based on past experiences the experts determined the prototypical structures to be used for each residential and commercial structure category. The experts then calculated the flood damage at various depths of flooding. The experts determined the elevation at which damage to each component of the structure would begin. The damage is defined as the cost to repair or replace the item. If it is feasible to repair the component, the repair cost is used. After each component in the structure is analyzed, the total damages at each increment of flooding are summed and shown as a percentage of the replacement cost of the structure. The depth-damage relationships that were developed for residential and non-residential structure types and the depth-damages relationships developed for vehicles under two hydrologic conditions (saltwater and freshwater flooding) will be presented. The resources required in generating site-specific depth-damage relationships and the duration of time required to complete the analysis will be discussed.